Listing of Claims:

Claim 1. (Currently Amended) A solid composition for electromagnetic energy-controlled generation and release of a gas comprising:

between about 50 wt. % and about 99.99 wt. % of an energy-activated catalyst capable of being activated by electromagnetic energy, and

between about 0.01 wt. % and about 50 wt. % of a solid containing anions capable of being oxidized or reacted to generate at least one gas wherein the anions are selected from the group consisting of chlorite, bisulfite, sulfite, hydrosulfide, sulfide, hypochlorite, cyanide and nitrite,

the solid composition, when exposed to electromagnetic energy, being capable of generating and releasing the gas from the solid for at least one week after activation of the catalyst and oxidation or reaction of the anions.

Claim 2. (Original) The composition of claim 1 wherein the solid is a salt, an inert material, a polyelectrolyte, a solid electrolyte, or a solid solution.

Claim 3. (Canceled)

Claim 4. (Original) The composition of claim 1 wherein the catalyst is selected from the group consisting of a metal oxide, a metal sulfide, a metal chalcogenite, a metal phosphide, a metal arsenide, a non-metallic semiconductor, a polymeric semiconductor, a photoactive homopolyanion, and a photoactive heteropolyion.

Claim 5. (Original) The composition of claim 1 wherein the metal oxide is selected from the group consisting of titanium dioxide, zinc oxide, tungsten trioxide, ruthenium dioxide, iridium dioxide, tin dioxide, strontium titanate, barium titanate, tantalum oxide, calcium titanate, iron (III) oxide, molybdenum trioxide, niobium

pentoxide, indium trioxide, cadmium oxide, hafnium oxide, zirconium oxide, manganese dioxide, copper oxide, vanadium pentoxide, chromium trioxide, yttrium trioxide, silver oxide, and $Ti_xZr_{1-x}O_2$ wherein x is between 0 and 1; the metal sulfide is cadmium sulfide, zinc sulfide, indium sulfide, copper sulfide, tungsten disulfide, bismuth trisulfide, or zinc cadmium disulfide; the metal chalcogenite is zinc selenide, cadmium selenide, indium selenide, tungsten selenide, or cadmium telluride; the metal phosphide is indium phosphide; the metal arsenide is gallium arsenide; the non-metallic semiconductor is silicon, silicon carbide, diamond, germanium, germanium dioxide, or germanium telluride; the polymeric semiconductor is polyacetylene; the photoactive homopolyanion is $W_{10}O_{32}^{-4}$; and the photoactive heteropolyion is $XM_{12}O_{40}^{-n}$ or $X_2M_{18}O_{62}^{-7}$ wherein x is Bi, Si, Ge, P or As, M is Mo or W, and n is an integer from 1 to 12.

Claim 6. (Canceled)

Claim 7. (Previously Amended) The composition of claim 1 wherein the gas is selected from the group consisting of chlorine dioxide, sulfur dioxide, hydrogen sulfide, chlorine, dichlorine monoxide, hydrocyanic acid, nitrogen dioxide, nitric oxide and nitrous oxide.

Claim 8. (Currently Amended) A solid composition for electromagnetic energy-controlled generation and release of a gas comprising:

between about 50 wt. % and about 99.99 wt. % of an energy-activated catalyst capable of being activated by electromagnetic energy, and

between about 0.01 wt. % and about 50 wt. % of a solid containing anions capable of being oxidized or reacted to generate at least one gas selected from the group consisting of chlorine dioxide, sulfur dioxide, hydrogen sulfide, dichlorine monoxide, hydrocyanic acid, nitrogen dioxide, nitric oxide and nitrous oxide,

the solid composition, when exposed to electromagnetic energy, being capable of generating and releasing the gas from the solid for at least one week after activation of the catalyst and oxidation or reaction of the anions.

Claim 9. (Original) The composition of claim 8 wherein the catalyst is selected from the group consisting of a metal oxide, a metal sulfide, a metal chalcogenite, a metal phosphide, a metal arsenide, a non-metallic semiconductor, a polymeric semiconductor, a photoactive homopolyanion, and a photoactive heteropolyion.

Claim 10. (Currently Amended) The composition of claim 8 [[9]] wherein the metal oxide is selected from the group consisting of titanium dioxide, zinc oxide, tungsten trioxide, ruthenium dioxide, iridium dioxide, tin dioxide, strontium titanate, barium titanate, tantalum oxide, calcium titanate, iron (III) oxide, molybdenum trioxide, niobium pentoxide, indium trioxide, cadmium oxide, hafnium oxide, zirconium oxide, manganese dioxide, copper oxide, vanadium pentoxide, chromium trioxide, yttrium trioxide, silver oxide, and $Ti_xZr_{1-x}O_2$ wherein x is between 0 and 1; the metal sulfide is cadmium sulfide, zinc sulfide, indium sulfide, copper sulfide, tungsten disulfide, bismuth trisulfide, or zinc cadmium disulfide; the metal chalcogenite is zinc selenide, cadmium selenide, indium selenide, tungsten selenide, or cadmium telluride; the metal phosphide is indium phosphide; the metal arsenide is gallium arsenide; the non-metallic semiconductor is silicon, silicon carbide, diamond, germanium, germanium dioxide, or germanium telluride; the polymeric semiconductor is polyacetylene; the photoactive homopolyanion is $W_{10}O_{32}^{-4}$; and the photoactive heteropolyion is $XM_{12}O_{40}^{-n}$ or $X_2M_{18}O_{62}^{-7}$ wherein x is Bi, Si, Ge, P or As, M is Mo or W, and n is an integer from 1 to 12.

Claim 11. (Currently Amended) A solid composition for electromagnetic energy-controlled generation and release of at least one gas comprising:

between about 50 wt. % and about 99.99 wt. % of an energy-activated catalyst capable of being activated by electromagnetic energy, and

between about 0.01 wt. % and about 50 wt. % of a solid containing chlorite or nitrite anions;

the solid composition, when exposed to electromagnetic energy, being capable of generating and releasing chlorine dioxide or a nitrogen oxide from the solid for at least one week after activation of the catalyst and oxidation or reaction of the anions.

Claim 12. (Withdrawn) A powder for generating at least one gas comprising:

a core containing an energy-activated catalyst capable of being activated by electromagnetic energy, and

particles or a layer on a surface of the core, the particles or the layer containing anions capable of being oxidized or reacted to generate at least one gas,

the powder, when exposed to electromagnetic energy, being capable of generating and releasing the gas after activation of the catalyst and oxidation or reaction of the anions.

Claim 13. (Withdrawn) The powder of claim 12 wherein the layer is continuous.

Claim 14. (Withdrawn) The powder of claim 12 wherein the layer and the particles are on the surface of the core.

Claim 15. (Withdrawn) The powder of claim 12 wherein the catalyst is selected from the group consisting of a metal oxide, a metal sulfide, a metal chalcogenite, a metal phosphide, a metal arsenide, a non-metallic semiconductor, a polymeric semiconductor, a photoactive homopolyanion, and a photoactive heteropolyion.

Claim 16. (Withdrawn) The powder of claim 15 wherein the metal oxide is

selected from the group consisting of titanium dioxide, zinc oxide, tungsten trioxide, ruthenium dioxide, iridium dioxide, tin dioxide, strontium titanate, barium titanate, tantalum oxide, calcium titanate, iron (III) oxide, molybdenum trioxide, niobium pentoxide, indium trioxide, cadmium oxide, hafnium oxide, zirconium oxide, manganese dioxide, copper oxide, vanadium pentoxide, chromium trioxide, yttrium trioxide, silver oxide, and $Ti_xZr_{1-x}O_2$ wherein x is between 0 and 1; the metal sulfide is cadmium sulfide, zinc sulfide, indium sulfide, copper sulfide, tungsten disulfide, bismuth trisulfide, or zinc cadmium disulfide; the metal chalcogenite is zinc selenide, cadmium selenide, indium selenide, tungsten selenide, or cadmium telluride; the metal phosphide is indium phosphide; the metal arsenide is gallium arsenide; the non-metallic semiconductor is silicon, silicon carbide, diamond, germanium, germanium dioxide, or germanium telluride; the polymeric semiconductor is polyacetylene; the photoactive homopolyanion is $W_{10}O_{32}^{-4}$; and the photoactive heteropolyion is $XM_{12}O_{40}^{-n}$ or $X_2M_{18}O_{62}^{-7}$ wherein x is Bi, Si, Ge, P or As, M is Mo or W, and n is an integer from 1 to 12.

Claim 17. (Withdrawn) The powder of claim 12 wherein the anions are selected from the group consisting of chlorite, bisulfite, sulfite, hydrosulfide, sulfide, hypochlorite, cyanide, bicarbonate, carbonate and nitrite.

Claim 18. (Withdrawn) The powder of claim 12 wherein the gas is selected from the group consisting of chlorine dioxide, sulfur dioxide, hydrogen sulfide, chlorine, dichlorine monoxide, hydrocyanic acid, carbon dioxide, nitrogen dioxide, nitric oxide, nitrous oxide and ozone.

Claim 19. (Withdrawn) A powder for generating at least one gas comprising:

a core containing an energy-activated catalyst capable of being activated by electromagnetic energy, and

particles or a layer on a surface of the core, the particles or the layer containing

chlorite, nitrite, or peroxide anions,

the powder, when exposed to electromagnetic energy, being capable of generating and releasing chlorine dioxide, a nitrogen oxide, or ozone after activation of the catalyst and oxidation or reaction of the anions.

Claim 20. (Withdrawn) The powder of claim 19 wherein the layer is continuous.

Claim 21. (Withdrawn) The powder of claim 19 wherein the layer and the particles are on the surface of the core.

Claim 22. (Withdrawn) The powder of claim 19 wherein the catalyst is selected from the group consisting of a metal oxide, a metal sulfide, a metal chalcogenite, a metal phosphide, a metal arsenide, a non-metallic semiconductor, a polymeric semiconductor, a photoactive homopolyanion, and a photoactive heteropolyion.

Claim 23. (Withdrawn) The powder of claim 22 wherein the metal oxide is selected from the group consisting of titanium dioxide, zinc oxide, tungsten trioxide, ruthenium dioxide, iridium dioxide, tin dioxide, strontium titanate, barium titanate, tantalum oxide, calcium titanate, iron (III) oxide, molybdenum trioxide, niobium pentoxide, indium trioxide, cadmium oxide, hafnium oxide, zirconium oxide, manganese dioxide, copper oxide, vanadium pentoxide, chromium trioxide, yttrium trioxide, silver oxide, and $Ti_xZr_{1-x}O_2$ wherein x is between 0 and 1; the metal sulfide is cadmium sulfide, zinc sulfide, indium sulfide, copper sulfide, tungsten disulfide, bismuth trisulfide, or zinc cadmium disulfide; the metal chalcogenite is zinc selenide, cadmium selenide, indium selenide, tungsten selenide, or cadmium telluride; the metal phosphide is indium phosphide; the metal arsenide is gallium arsenide; the non-metallic semiconductor is silicon, silicon carbide, diamond, germanium, germanium dioxide, or germanium telluride; the polymeric semiconductor is polyacetylene; the photoactive homopolyanion

is $W_{10}O_{32}^{-4}$; and the photoactive heteropolyion is $XM_{12}O_{40}^{-n}$ or $X_2M_{18}O_{62}^{-7}$ wherein x is Bi, Si, Ge, P or As, M is Mo or W, and n is an integer from 1 to 12.

Claim 24. (Withdrawn) A method for providing controlled release of at least one gas comprising:

(a) providing a solid or a solids-containing suspension containing an energy-activated catalyst and anions capable of being oxidized or reacted to generate at least one gas, and

(b) exposing the solid or the solids-containing suspension to electromagnetic energy to activate the catalyst and oxidize or react the anions to generate and release the gas.

Claim 25. (Withdrawn) The method of claim 24 further including after step (b) the step (c) of preventing electromagnetic energy from contacting the solid or the solids-containing suspension to stop or minimize generation and release of the gas from the solid or the solids-containing suspension.

Claim 26. (Withdrawn) The method of claim 25 further including after step (c) the step (d) of exposing the solid or the solids-containing suspension to electromagnetic energy to resume or increase generation and release of the gas from the solid or the solids-containing suspension.

Claim 27. (Withdrawn) The method of claim 24 wherein the solid is a powder, a film, a coating, or a fiber.

Claim 28. (Withdrawn) A method of retarding, killing, preventing or controlling microbiological contamination on a surface of a material, within the material or in the atmosphere surrounding the material, comprising placing a material adjacent to a composition that does not release a biocidal gas in the absence of electromagnetic

energy, and exposing the composition to electromagnetic energy to generate and release at least one biocidal gas from the composition into the atmosphere surrounding the material.

Claim 29. (Withdrawn) A method of retarding, preventing, inhibiting or controlling biochemical decomposition on a surface of a material or within the material comprising placing the material adjacent to a composition that does not release a biochemical decomposition-inhibiting gas in the absence of electromagnetic energy, and exposing the composition to electromagnetic energy to generate and release at least one biochemical decomposition-inhibiting gas from the composition into the atmosphere surrounding the material.

Claim 30. (Withdrawn) A method of controlling respiration of a material comprising placing the material adjacent to a composition that does not release a respiration-controlling gas in the absence of electromagnetic energy, and exposing the composition to electromagnetic energy to generate and release at least one respiration-controlling gas from the composition into the atmosphere surrounding the material.

Claim 31. (Withdrawn) A method of deodorizing a surface of a material or the atmosphere surrounding the material or enhancing freshness of the material, comprising placing a material adjacent to a composition that does not release a deodorizing gas in the absence of electromagnetic energy, and exposing the composition to electromagnetic energy to generate and release at least one deodorizing gas from the composition into the atmosphere surrounding the material.

Claim 32. (Withdrawn) A method of retarding, preventing, inhibiting, or controlling chemotactic attraction of an organism to a material, comprising placing a material adjacent to a composition that does not release an odor-masking gas or an

odor-neutralizing gas in the absence of electromagnetic energy, and exposing the composition to electromagnetic energy to generate and release at least one odor-masking gas or odor-neutralizing gas from the composition into the atmosphere surrounding the material.

Claim 33. (Withdrawn) A method of retarding, preventing or controlling biological contamination of an atmosphere comprising exposing the composition to electromagnetic energy to generate and release at least one decontaminating gas from the composition into the atmosphere surrounding the composition.

Claim 34. (Withdrawn) A method of retarding, preventing or controlling biological contamination of a material comprising placing the material adjacent to the composition, and exposing the composition to electromagnetic energy to generate and release at least one decontaminating gas from the composition into the atmosphere surrounding the material.

Claim 35. (Withdrawn) A method of retarding, killing, preventing, or controlling microbiological contamination, or retarding, preventing, inhibiting, or controlling biochemical decomposition on a surface of a material, within the material or in the atmosphere surrounding the material, deodorizing a surface of a material or the atmosphere surrounding the material, enhancing freshness of the material, or retarding, preventing, inhibiting, or controlling chemotactic attraction of an organism to a material, comprising placing a material adjacent to a composition that does not release chlorine dioxide gas in the absence of electromagnetic energy, and exposing the composition to electromagnetic energy to generate and release chlorine dioxide gas from the composition into the atmosphere surrounding the material.

Claim 36. (Withdrawn) A process for preparing a powder providing controlled

sustained release of at least one gas, the process comprising:

admixing an energy-activated catalyst and particles containing anions capable of being oxidized or reacted to generate at least one gas with a solvent to form a suspension, and

forming a powder from the suspension,

the powder, when exposed to electromagnetic energy, being capable of generating and releasing the gas after activation of the catalyst and oxidation or reaction of the anions.

Claim 37. (Withdrawn) The process of claim 36 wherein the particle is a salt selected from the group consisting of an alkali metal chlorite, an alkaline-earth metal chlorite, a chlorite salt of a transition metal ion, a protonated primary, secondary or tertiary amine, or a quaternary amine, an alkali metal bisulfite, an alkaline-earth metal bisulfite, a bisulfite salt of a transition metal ion, a protonated primary, secondary or tertiary amine, or a quaternary amine, an alkali metal sulfite, an alkaline-earth metal sulfite, a sulfite salt of a transition metal ion, a protonated primary, secondary or tertiary amine, or a quaternary amine, an alkali metal sulfide, an alkaline-earth metal sulfide, a sulfide salt of a transition metal ion, a protonated primary, secondary or tertiary amine, or a quaternary amine, an alkali metal hydrosulfide, an alkaline-earth metal hydrosulfide, a hydrosulfide salt of a transition metal ion, a protonated primary, secondary or tertiary amine, or a quaternary amine, an alkali metal nitrite, an alkaline-earth metal nitrite, a nitrite salt of a transition metal ion, a protonated primary, secondary or tertiary amine, or a quaternary amine, an alkali metal hypochlorite, an alkaline-earth metal hypochlorite, a hypochlorite salt of a transition metal ion, a protonated primary, secondary or tertiary amine, or a quaternary amine, an alkali metal cyanide, an alkaline-earth metal cyanide, and a cyanide salt of a transition metal ion, a protonated primary, secondary or tertiary amine, or a quaternary amine.

Claim 38. (Currently Amended) A solid composition for photo-controlled generation and release of at least one gas comprising:

between about 50 wt. % and about 99.99 wt. % of a photocatalyst capable of being activated by light, and

between about 0.01 wt. % and about 50 wt. % of a solid containing anions capable of photo-oxidizing or reacting to generate at least one gas wherein the anions are selected from the group consisting of chlorite, bisulfite, sulfite, hydrosulfide, sulfide, hypochlorite, cyanide and nitrite,

the solid composition, when exposed to light, being capable of generating and releasing the gas from the solid for at least one week after activation of the photocatalyst and photo-oxidation or reaction of the anions.

Claim 39. (Original) The composition of claim 38 wherein the solid is a salt, an inert material, a polyelectrolyte, a solid electrolyte, or a solid solution.

Claim 40. (Canceled)

Claim 41. (Original) The composition of claim 38 wherein the photocatalyst is selected from the group consisting of a metal oxide, a metal sulfide, a metal chalcogenite, a metal phosphide, a metal arsenide, a non-metallic semiconductor, a polymeric semiconductor, a photoactive homopolyanion, and a photoactive heteropolyion.

Claim 42. (Original) The composition of claim 41 wherein the metal oxide is selected from the group consisting of titanium dioxide, zinc oxide, tungsten trioxide, ruthenium dioxide, iridium dioxide, tin dioxide, strontium titanate, barium titanate, tantalum oxide, calcium titanate, iron (III) oxide, molybdenum trioxide, niobium pentoxide, indium trioxide, cadmium oxide, hafnium oxide, zirconium oxide, manganese

dioxide, copper oxide, vanadium pentoxide, chromium trioxide, yttrium trioxide, silver oxide, and $Ti_xZr_{1-x}O_2$ wherein x is between 0 and 1; the metal sulfide is cadmium sulfide, zinc sulfide, indium sulfide, copper sulfide, tungsten disulfide, bismuth trisulfide, or zinc cadmium disulfide; the metal chalcogenite is zinc selenide, cadmium selenide, indium selenide, tungsten selenide, or cadmium telluride; the metal phosphide is indium phosphide; the metal arsenide is gallium arsenide; the non-metallic semiconductor is silicon, silicon carbide, diamond, germanium, germanium dioxide, or germanium telluride; the polymeric semiconductor is polyacetylene; the photoactive homopolyanion is $W_{10}O_{32}^{-4}$; and the photoactive heteropolyion is $XM_{12}O_{40}^{-n}$ or $X_2M_{18}O_{62}^{-7}$ wherein x is Bi, Si, Ge, P or As, M is Mo or W, and n is an integer from 1 to 12.

Claim 43. (Canceled)

Claim 44. (Previously Amended) The composition of claim 38 wherein the gas is selected from the group consisting of chlorine dioxide, sulfur dioxide, hydrogen sulfide, chlorine, dichlorine monoxide, hydrocyanic acid, nitrogen dioxide, nitric oxide and nitrous oxide.

Claim 45. (Original) The composition of claim 38 wherein the light is ultraviolet light or visible light.

Claim 46. (Currently Amended) A solid composition for photo-controlled generation and release of at least one gas comprising:

between about 50 wt. % and about 99.99 wt. % of a photocatalyst capable of being activated by light, and

between about 0.01 wt. % and about 50 wt. % of a solid containing anions capable of photo-oxidizing or reacting to generate at least one gas selected from the group consisting of chlorine dioxide, sulfur dioxide, hydrogen sulfide,

dichlorine monoxide, hydrocyanic acid, nitrogen dioxide, nitric oxide and nitrous oxide, the solid composition, when exposed to light, being capable of generating and releasing the gas from the solid for at least one week after activation of the photocatalyst and photo-oxidation or reaction of the anions.

Claim 47. (Original) The composition of claim 46 wherein the photocatalyst is selected from the group consisting of a metal oxide, a metal sulfide, a metal chalcogenite, a metal phosphide, a metal arsenide, a non-metallic semiconductor, a polymeric semiconductor, a photoactive homopolyanion, and a photoactive heteropolyion.

Claim 48. (Original) The composition of claim 47 wherein the metal oxide is selected from the group consisting of titanium dioxide, zinc oxide, tungsten trioxide, ruthenium dioxide, iridium dioxide, tin dioxide, strontium titanate, barium titanate, tantalum oxide, calcium titanate, iron (III) oxide, molybdenum trioxide, niobium pentoxide, indium trioxide, cadmium oxide, hafnium oxide, zirconium oxide, manganese dioxide, copper oxide, vanadium pentoxide, chromium trioxide, yttrium trioxide, silver oxide, and $Ti_xZr_{1-x}O_2$ wherein x is between 0 and 1; the metal sulfide is cadmium sulfide, zinc sulfide, indium sulfide, copper sulfide, tungsten disulfide, bismuth trisulfide, or zinc cadmium disulfide; the metal chalcogenite is zinc selenide, cadmium selenide, indium selenide, tungsten selenide, or cadmium telluride; the metal phosphide is indium phosphide; the metal arsenide is gallium arsenide; the non-metallic semiconductor is silicon, silicon carbide, diamond, germanium, germanium dioxide, or germanium telluride; the polymeric semiconductor is polyacetylene; the photoactive homopolyanion is $W_{10}O_{32}^{-4}$; and the photoactive heteropolyion is $XM_{12}O_{40}^{-n}$ or $X_2M_{18}O_{62}^{-7}$ wherein x is Bi, Si, Ge, P or As, M is Mo or W, and n is an integer from 1 to 12.

Claim 49. (Original) The composition of claim 46 wherein the light is ultraviolet light or visible light.

Claim 50. (Currently Amended) A solid composition for photo-controlled generation and release of at least one gas comprising:

between about 50 wt. % and about 99.99 wt. % of a photocatalyst capable of being activated by light, and

between about 0.01 wt. % and about 50 wt. % of a solid containing chlorite or nitrite anions,

the solid composition, when exposed to light, being capable of generating and releasing chlorine dioxide or a nitrogen oxide from the solid for at least one week after activation of the photocatalyst and photo-oxidation or reaction of the anions.

Claim 51. (Withdrawn) A powder for generating at least one gas comprising:

a core containing a photocatalyst capable of being activated by light, and

particles or a layer on a surface of the core, the particles or the layer containing anions capable of photo-oxidizing or reacting to generate at least one gas,

the powder, when exposed to light, being capable of generating and releasing the gas after activation of the photocatalyst and photo-oxidation or reaction of the anions.

Claim 52. (Withdrawn) The powder of claim 51 wherein the layer is continuous.

Claim 53. (Withdrawn) The powder of claim 51 wherein the layer and the particles are on the surface of the core.

Claim 54. (Withdrawn) The powder of claim 51 wherein the photocatalyst is selected from the group consisting of a metal oxide, a metal sulfide, a metal

chalcogenite, a metal phosphide, a metal arsenide, a non-metallic semiconductor, a polymeric semiconductor, a photoactive homopolyanion, and a photoactive heteropolyion.

Claim 55. (Withdrawn) The powder of claim 54 wherein the metal oxide is selected from the group consisting of titanium dioxide, zinc oxide, tungsten trioxide, ruthenium dioxide, iridium dioxide, tin dioxide, strontium titanate, barium titanate, tantalum oxide, calcium titanate, iron (III) oxide, molybdenum trioxide, niobium pentoxide, indium trioxide, cadmium oxide, hafnium oxide, zirconium oxide, manganese dioxide, copper oxide, vanadium pentoxide, chromium trioxide, yttrium trioxide, silver oxide, and $Ti_xZr_{1-x}O_2$ wherein x is between 0 and 1; the metal sulfide is cadmium sulfide, zinc sulfide, indium sulfide, copper sulfide, tungsten disulfide, bismuth trisulfide, or zinc cadmium disulfide; the metal chalcogenite is zinc selenide, cadmium selenide, indium selenide, tungsten selenide, or cadmium telluride; the metal phosphide is indium phosphide; the metal arsenide is gallium arsenide; the non-metallic semiconductor is silicon, silicon carbide, diamond, germanium, germanium dioxide, or germanium telluride; the polymeric semiconductor is polyacetylene; the photoactive homopolyanion is $W_{10}O_{32}^{-4}$; and the photoactive heteropolyion is $XM_{12}O_{40}^{-n}$ or $X_2M_{18}O_{62}^{-7}$ wherein x is Bi, Si, Ge, P or As, M is Mo or W, and n is an integer from 1 to 12.

Claim 56. (Withdrawn) The powder of claim 51 wherein the anions are selected from the group consisting of chlorite, bisulfite, sulfite, hydrosulfide, sulfide, hypochlorite, cyanide, bicarbonate, carbonate and nitrite.

Claim 57. (Withdrawn) The powder of claim 51 wherein the gas is selected from the group consisting of chlorine dioxide, sulfur dioxide, hydrogen sulfide, chlorine, dichlorine monoxide, hydrocyanic acid, carbon dioxide, nitrogen dioxide, nitric oxide, nitrous oxide, and ozone.

Claim 58. (Withdrawn) The powder of claim 51 wherein the light is ultraviolet light or visible light.

Claim 59. (Withdrawn) A powder for generating chlorine dioxide comprising:

a core containing a photocatalyst capable of being activated by light, and

particles or a layer on a surface of the core, the particles or the layer containing chlorite anions,

the powder, when exposed to light, being capable of generating and releasing chlorine dioxide after activation of the photocatalyst and photo-oxidation or reaction of the anions.

Claim 60. (Withdrawn) The powder of claim 59 wherein the layer is continuous.

Claim 61. (Withdrawn) The powder of claim 59 wherein the layer and the particles are on the surface of the core.

Claim 62. (Withdrawn) The powder of claim 59 wherein the photocatalyst is selected from the group consisting of a metal oxide, a metal sulfide, a metal chalcogenite, a metal phosphide, a metal arsenide, a non-metallic semiconductor, a polymeric semiconductor, a photoactive homopolyanion, and a photoactive heteropolyion.

Claim 63. (Withdrawn) The powder of claim 59 wherein the metal oxide is selected from the group consisting of titanium dioxide, zinc oxide, tungsten trioxide, ruthenium dioxide, iridium dioxide, tin dioxide, strontium titanate, barium titanate, tantalum oxide, calcium titanate, iron (III) oxide, molybdenum trioxide, niobium pentoxide, indium trioxide, cadmium oxide, hafnium oxide, zirconium oxide, manganese

dioxide, copper oxide, vanadium pentoxide, chromium trioxide, yttrium trioxide, silver oxide, and $Ti_xZr_{1-x}O_2$ wherein x is between 0 and 1; the metal sulfide is cadmium sulfide, zinc sulfide, indium sulfide, copper sulfide, tungsten disulfide, bismuth trisulfide, or zinc cadmium disulfide; the metal chalcogenite is zinc selenide, cadmium selenide, indium selenide, tungsten selenide, or cadmium telluride; the metal phosphide is indium phosphide; the metal arsenide is gallium arsenide; the non-metallic semiconductor is silicon, silicon carbide, diamond, germanium, germanium dioxide, or germanium telluride; the polymeric semiconductor is polyacetylene; the photoactive homopolyanion is $W_{10}O_{32}^{-4}$; and the photoactive heteropolyion is $XM_{12}O_{40}^{-n}$ or $X_2M_{18}O_{62}^{-7}$ wherein x is Bi, Si, Ge, P or As, M is Mo or W, and n is an integer from 1 to 12.

Claim 64. (Withdrawn) A method for providing controlled generation and release of at least one gas comprising:

(a) providing a solid or a solids-containing suspension containing a photocatalyst and anions capable of photo-oxidizing or reacting to generate at least one gas, and

(b) exposing the solid or the solids-containing suspension to light to activate the photocatalyst and photo-oxidize or react the anions to generate and release the gas.

Claim 65. (Withdrawn) The method of claim 64 further including after step (b) the step (c) of preventing light from contacting the solid or the solids-containing suspension to stop or minimize generation and release of the gas from the solid or the solids-containing suspension.

Claim 66. (Withdrawn) The method of claim 65 further including after step (c) the step (d) of exposing the solid or the solids-containing suspension to light to resume or increase generation and release of the gas from the solid or the solids-containing

suspension.

Claim 67. (Withdrawn) The method of claim 64 wherein the solid is a powder, a film, a coating, a tablet, or a fiber.

Claim 68. (Withdrawn) A method of retarding, killing, preventing or controlling microbiological contamination on a surface of a material, within the material or in the atmosphere surrounding the material, comprising placing a material adjacent to a composition that does not release a biocidal gas in the absence of light, and exposing the composition to light to generate and release at least one biocidal gas from the composition into the atmosphere surrounding the material.

Claim 69. (Withdrawn) A method of retarding, preventing, inhibiting or controlling biochemical decomposition on a surface of a material or within the material comprising placing the material adjacent to a composition that does not release a biochemical decomposition-inhibiting gas in the absence of light, and exposing the composition to light to generate and release at least one biochemical decomposition-inhibiting gas from the composition into the atmosphere surrounding the material.

Claim 70. (Withdrawn) A method of controlling respiration of a material comprising placing the material adjacent to a composition that does not release a respiration-controlling gas in the absence of light, and exposing the composition to light to generate and release at least one respiration-controlling gas from the composition into the atmosphere surrounding the material.

Claim 71. (Withdrawn) A method of deodorizing a surface of a material or the atmosphere surrounding the material or enhancing freshness of the material, comprising placing a material adjacent to a composition that does not release a

deodorizing gas in the absence of light, and exposing the composition to light to generate and release at least one deodorizing gas from the composition into the atmosphere surrounding the material.

Claim 72. (Withdrawn) A method of retarding, preventing, inhibiting, or controlling chemotactic attraction of an organism to a material, comprising placing a material adjacent to a composition that does not release an odor-masking gas or an odor-neutralizing gas in the absence of light, and exposing the composition to light to generate and release at least one odor-masking gas or odor-neutralizing gas from the composition into the atmosphere surrounding the material.

Claim 73. (Withdrawn) A method of retarding, preventing or controlling biological contamination of an atmosphere by exposing the composition to light to generate and release at least one decontaminating gas from the composition into the atmosphere surrounding the composition.

Claim 74. (Withdrawn) A method of retarding, killing, preventing, or controlling microbiological contamination, or retarding, preventing, inhibiting, or controlling biochemical decomposition on a surface of a material, within the material or in the atmosphere surrounding the material, deodorizing a surface of a material or the atmosphere surrounding the material, enhancing freshness of the material, or retarding, preventing, inhibiting, or controlling chemotactic attraction of an organism to a material, comprising placing a material adjacent to a composition that does not release chlorine dioxide gas in the absence of light, and exposing the composition to light to generate and release chlorine dioxide gas from the composition into the atmosphere surrounding the material.

Claim 75. (Withdrawn) A process for preparing a powder providing controlled

sustained release of at least one gas, the process comprising:

admixing a photocatalyst and particles containing anions that are capable of photo-oxidizing or reacting to generate at least one gas with a solvent to form a suspension; and

forming a powder from the suspension,

the powder, when exposed to light, being capable of generating and releasing the gas after activation of the photocatalyst and photo-oxidation or reaction of the anions.

Claim 76. (Withdrawn) The process of claim 75 wherein the particle is a salt selected from the group consisting of an alkali metal chlorite, an alkaline-earth metal chlorite, a chlorite salt of a transition metal ion, a protonated primary, secondary or tertiary amine, or a quaternary amine, an alkali metal bisulfite, an alkaline-earth metal bisulfite, a bisulfite salt of a transition metal ion, a protonated primary, secondary or tertiary amine, or a quaternary amine, an alkali metal sulfite, an alkaline-earth metal sulfite, a sulfite salt of a transition metal ion, a protonated primary, secondary or tertiary amine, or a quaternary amine, an alkali metal sulfide, an alkaline-earth metal sulfide, a sulfide salt of a transition metal ion, a protonated primary, secondary or tertiary amine, or a quaternary amine, an alkali metal hydrosulfide, an alkaline-earth metal hydrosulfide, a hydrosulfide salt of a transition metal ion, a protonated primary, secondary or tertiary amine, or a quaternary amine, an alkali metal nitrite, an alkaline-earth metal nitrite, a nitrite salt of a transition metal ion, a protonated primary, secondary or tertiary amine, or a quaternary amine, an alkali metal hypochlorite, an alkaline-earth metal hypochlorite, a hypochlorite salt of a transition metal ion, a protonated primary, secondary or tertiary amine, or a quaternary amine, an alkali metal cyanide, an alkaline-earth metal cyanide, and a cyanide salt of a transition metal ion, a protonated primary, secondary or tertiary amine, or a quaternary amine.

Claim 77. (Withdrawn) A composite for electromagnetic energy-controlled generation and release of at least one gas comprising:

a gas-generating layer comprising an energy-activated catalyst capable of being activated by electromagnetic energy, and anions capable of being oxidized or reacted to generate at least one gas; and

a barrier layer adjacent to a surface of the gas-generating layer, the barrier layer being capable of transmitting electromagnetic energy to the gas-generating layer and being impermeable or semipermeable to the gas;

the gas-generating layer, when exposed to electromagnetic energy, being capable of generating and releasing the gas after activation of the catalyst and oxidation or reaction of the anions.

Claim 78. (Withdrawn) A composition for electromagnetic energy-controlled and moisture-controlled generation and release of at least one gas comprising:

an energy-activated catalyst capable of being activated by electromagnetic energy,

anions capable of reacting with a protic species generated during activation of the catalyst or oxidizing to generate at least one gas,

an acid releasing agent, and

anions capable of reacting with hydronium ions to generate at least one gas,

the composition, when exposed to electromagnetic energy and moisture, being capable of generating and releasing the gas after activation of the catalyst, hydrolysis of the acid releasing agent, and oxidation or reaction of the anions.